RUC snow cover fix
- use of NESDIS snow data to trim RUC snow areal coverage

Background:

• Complaints from NWS Eastern (Burlington), NWS Central (Cleveland), other offices from too extensive RUC snow cover and too cold 2m temperatures in conditions of warm air advection over partial snow cover over past few years, especially in spring.

• Complaint from Weather Channel (Joe Koval) on RUC snow cover not melting quickly enough in fall 2008.

• RUC uses cycled snow cover, snow water equivalent (SWE), snow temperature in 1h cycle, melting forced by RUC LSM and, in part, by hourly assimilation of sfc obs.   Effective RUC snow evolution overall, especially for diurnal effects and under cloudy conditions (advantage over NESDIS snow), but vulnerable sometimes in areal coverage.

Stan Benjamin - NOAA/ESRL
9 Feb 2009

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Code fix:

• Use NESDIS snow cover in RUC model preprocessor (hybcst_pre) to trim cycled RUC snow fields under following conditions:

- Applied once daily in RUC cycle when new NESDIS snow/ice analysis becomes available (usually 19z)
- Apply at horizontal grid points with RUC snow cover where NESDIS shows no snow cover
  - if RUC 1h forecast surface temp > 274K (above freezing), and
  - if there is no snow, rain, or graupel in previous RUC 1h forecast
- If these conditions are not met, no change made -- possible ambiguity from clouds, current snow event, or finer RUC elevation.
- Routines changed: inithybv_pre.f, snohires.f. NESDIS snow/ice data already used in RUC hybcst_pre for ice cover information.
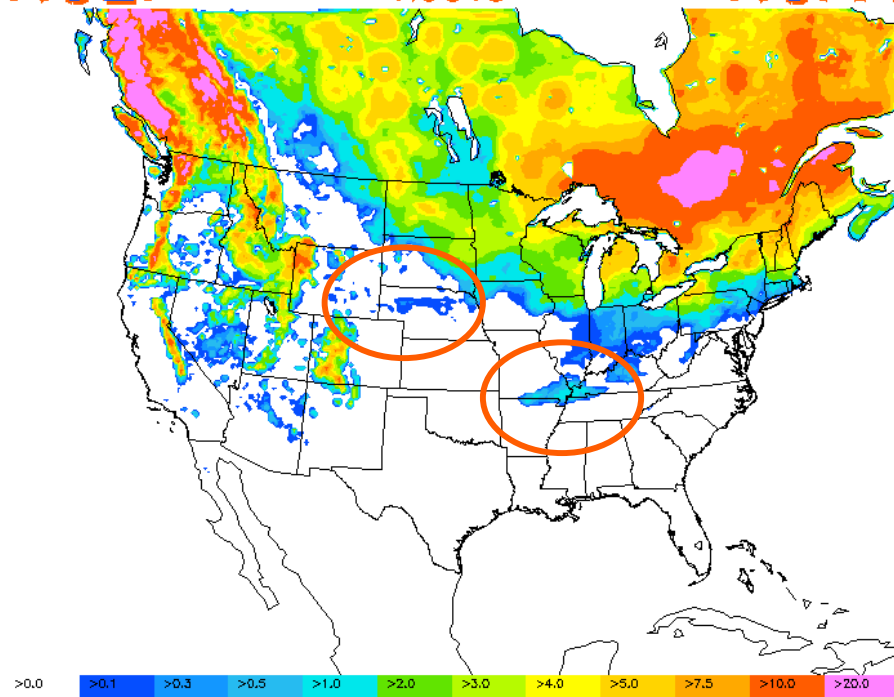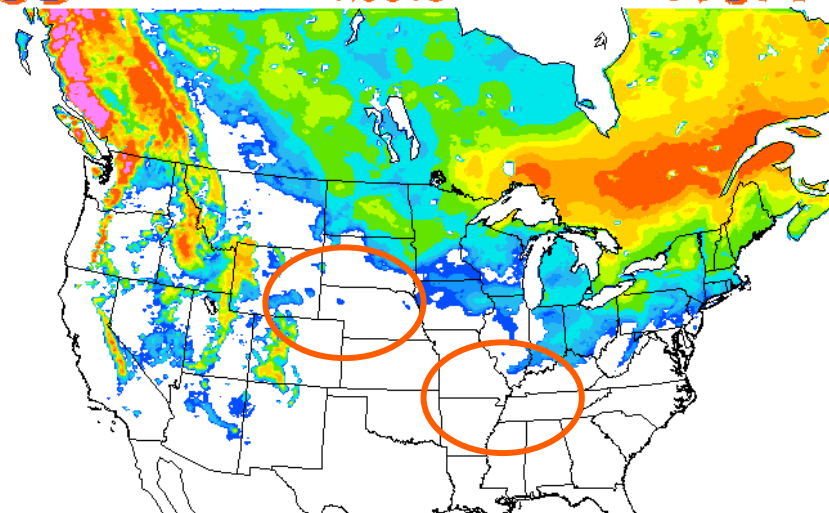
NCEP — *Operational* RUC13 — NOAA GSD — *Development* RUC13 — NOAA
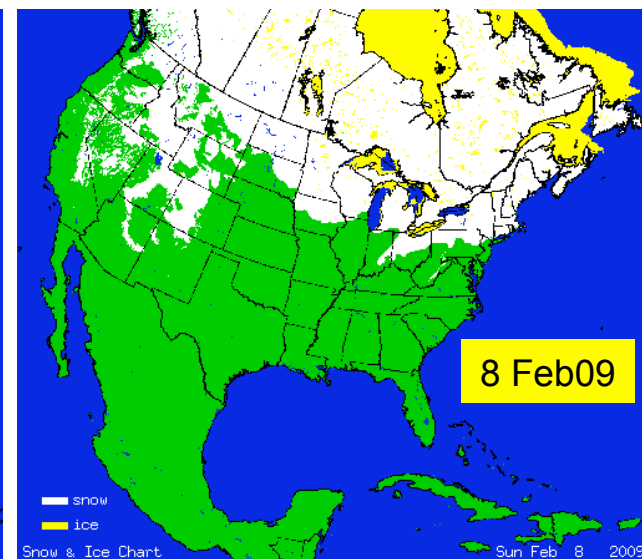
Snow Water Depth (inches)
3-hr fcst valid 08-Feb-09 22:00Z

Snow Water Depth (inches)
3-hr fcst valid 08-Feb-09 22:00Z

Dev13RUC w/ code fix made 7 Feb, application so far on 7 Feb and 8 Feb

NESDIS snow cover

http://www.natice.noaa.gov/pub/ims_gif/DATA/cursnow_usa.gif
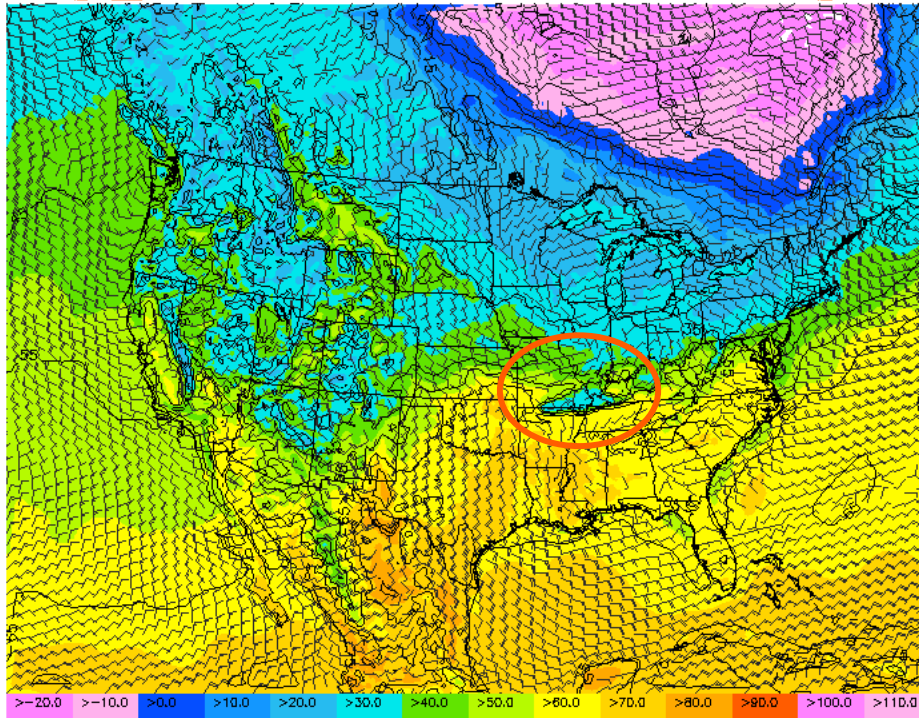
7 Feb09

8 Feb09

Errors in 2m temp due to erroneous snow cover in operational RUC
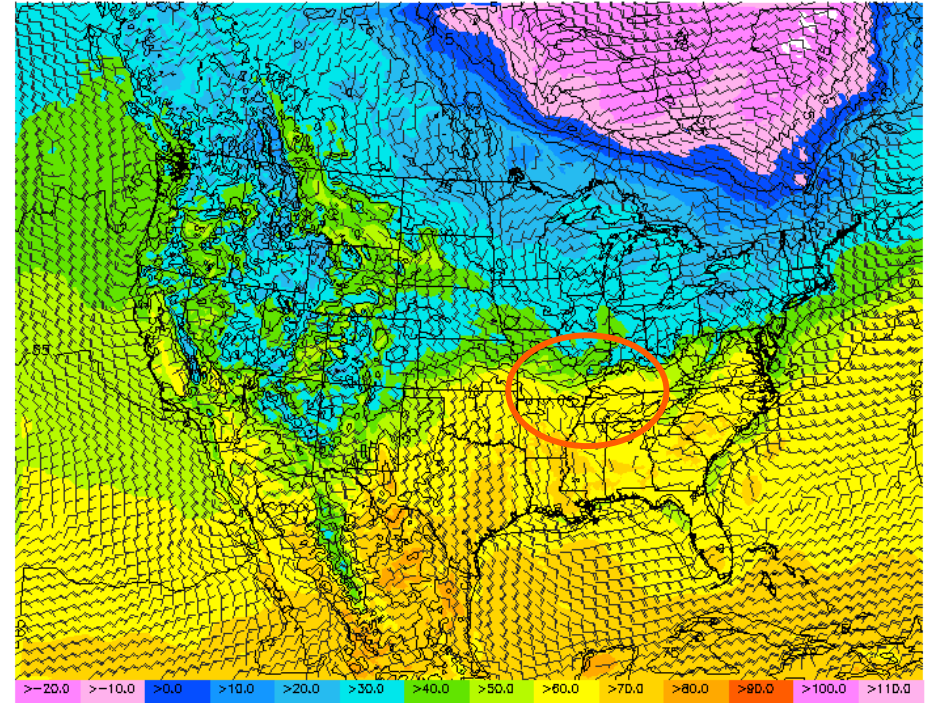
Improved 2m temp in dev13RUC with hybcst_pre correction for NESDIS areal trimming.
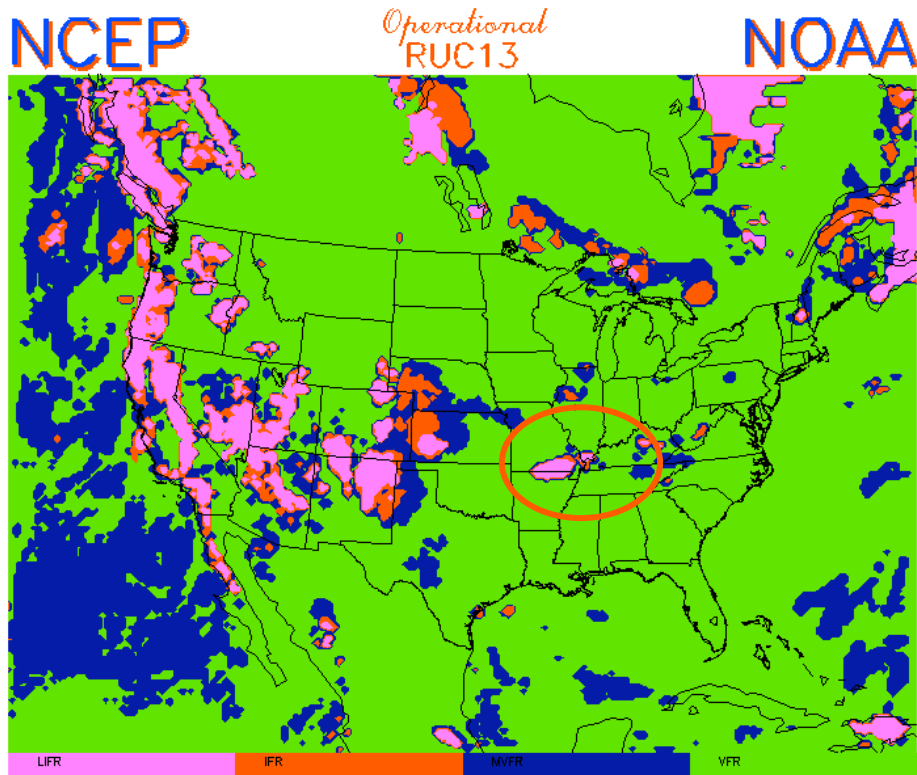
Another consequence from snow cover error:
Low fog due to erroneous snow cover in operational RUC
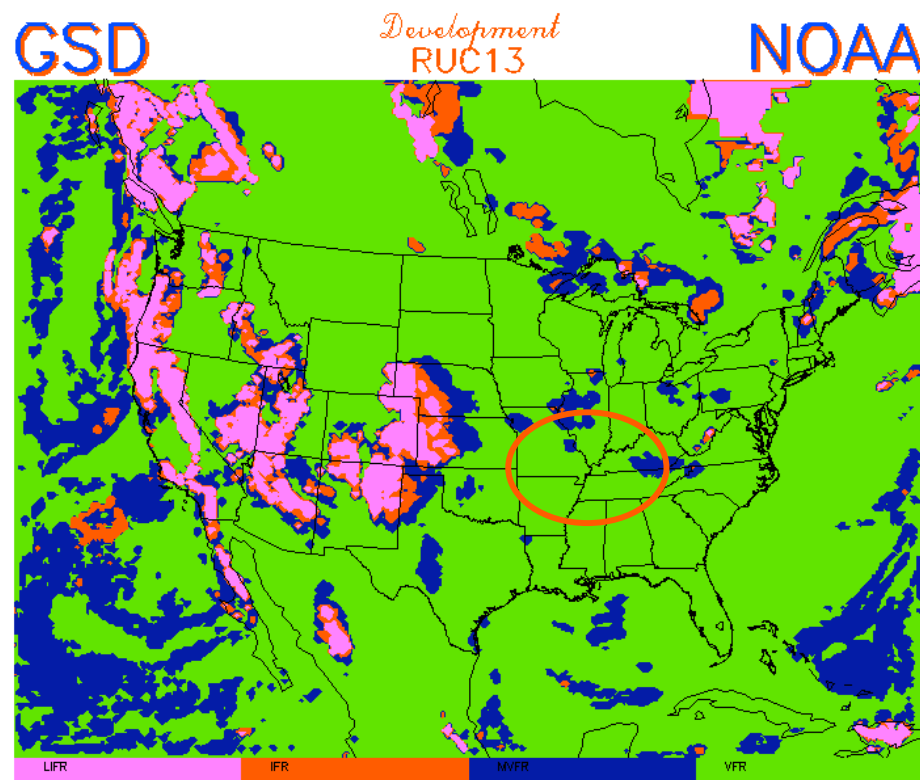
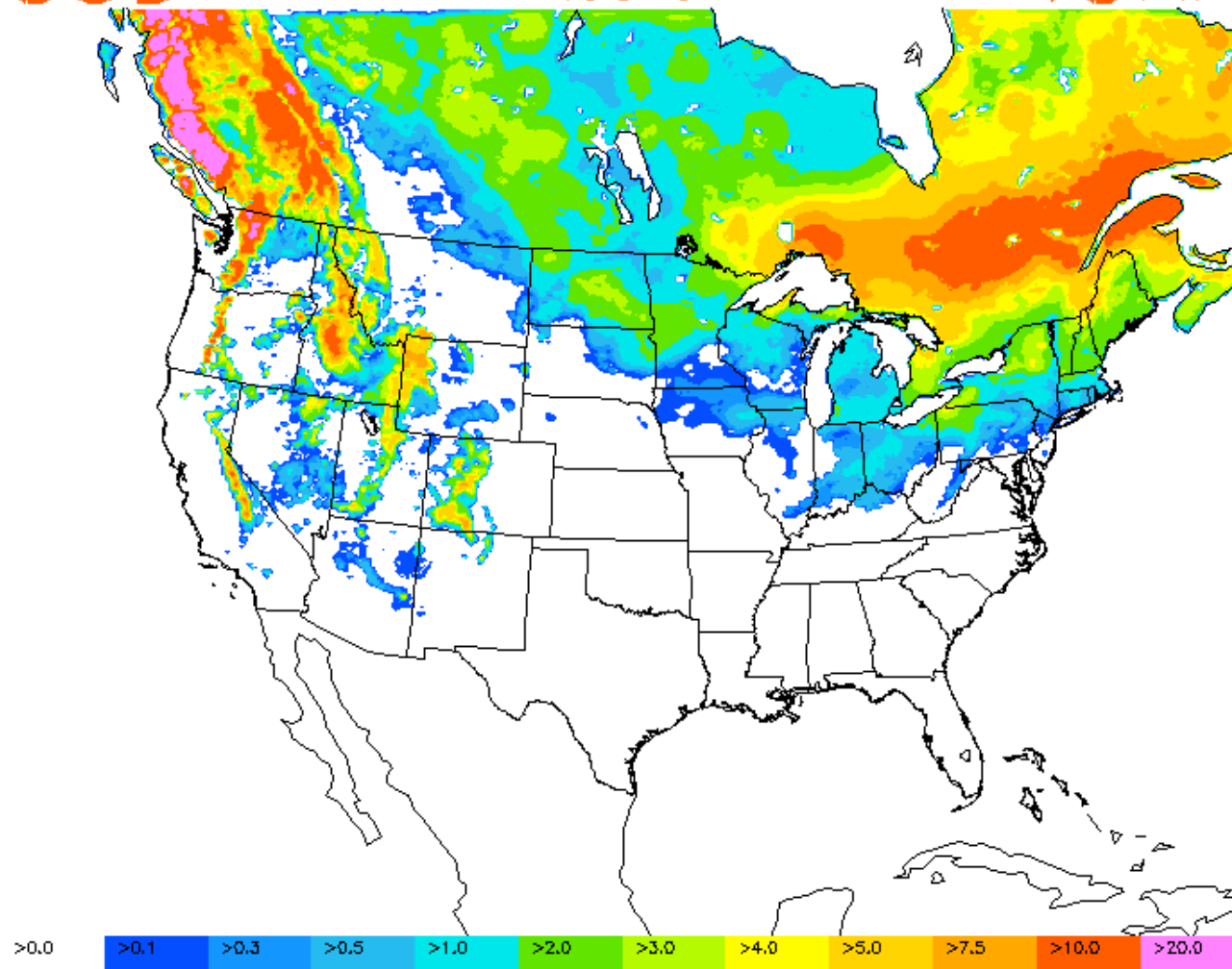Improved cloud cover in dev13RUC with hybcst_pre correction for NESDIS areal trimming.

NCEP   *Operational* RUC13   NOAA

Snow Water Depth (inches)

3-hr fcst valid 08-Feb-09 22:00Z

| >0.0 | >0.1 | >0.3 | >0.5 | >1.0 | >2.0 | >3.0 | >4.0 | >5.0 | >7.5 | >10.0 | >20.0 |

GSD

Development
RUC13

NOAA

Snow Water Depth (inches)

3-hr fcst valid 08-Feb-09 22:00Z

| >0.0 | >0.1 | >0.3 | >0.5 | >1.0 | >2.0 | >3.0 | >4.0 | >5.0 | >7.5 | >10.0 | >20.0 |